



ARPA-E's 37 Projects Selected From Funding Opportunity Announcement #1

Project Title: Adaptive Turbine Blades: Blown Wing Technology for Low-Cost Wind Power
Organization: PAX Streamline, Inc.
Funding Amount: \$3,000,000
Website: www.paxscientific.com

Brief Description of Project

Circulation control technology or "Blown Wing" technology creates a virtual airfoil by jetting compressed air out of orifices along a wing and has the potential to introduce a radical simplification to the manufacture and operation of wind turbines. Unlike a fixed airfoil, a "blown wing" can be dynamically adjusted to maximize power under a wide range of wind conditions. And, unlike fixed airfoils which must be laboriously manufactured to high precision, an effective blown wing can be generated from a slotted extruded pipe that can be domestically manufactured at a fraction of the cost. Blown wing technology has been demonstrated on fixed and rotary wing aircraft by the DOD but no demonstration of blown wing technology has been attempted for wind turbines. We propose a 24-month program to analyze, engineer and prototype a blown wing wind turbine at the 100 kW scale. If we are successful, we could introduce a radically simplified turbine system to the marketplace, enabling the economic proliferation of distributed, medium-scale wind turbine technology in lower class wind sites throughout the United States.

Why ARPA-E Funding and Not Private Capital

PAX Streamline had approached a number of private-sector investors for support for the development of this novel wind technology. Potential investors felt the project had too much technical risk and that a demonstration at 100 KW scale was vital before an investment was possible.

Uniqueness/Benefits of Technology

Unlike a fixed airfoil, a "blown wing" can be dynamically adjusted to maximize power under a wide range of wind conditions. And, unlike fixed airfoils which must be laboriously manufactured to high precision, an effective blown wing can be generated from a slotted extruded pipe that can be domestically manufactured at a fraction of the cost. The implementation of a "blown wing" would eliminate the need for pitch control and brakes, significantly simplifying the design and cost of a wind turbine.

Addressable Market & Potential Customers

We are focusing this technology development on the mid-size wind turbine market. This market is estimated to be \$10B in the US by 2013.

Key Team Member Bios

Dr. Robert Englar (Georgia Institute of Technology) is a leader of circulation control technology and leads a research group in aeronautics and fluid mechanics.

Mr. Paul Lees (PAX Streamline, Inc.) is an experienced aeronautical engineer with extensive background in computational fluid dynamics modeling. **Mr. Case van Dam** (Consultant) is a nationally-recognized expert in the field of mechanical and aeronautical engineering and leads a research program at the University of California at Davis.

Michael Zuteck (Consultant) is a leader in wind turbine engineering and testing and has led rotor research and qualification studies for 30 years.



For inquiries, contact:

Email:

ARPA-E@hq.doe.gov

Website:

<http://arpa-e.energy.gov/>

Miscellaneous

The award of the ARPA-E grant was the tipping point for Khosla Ventures to make an additional major investment into the development of this promising technology.

Testimonials

We have extensive experience in applying for, winning, and managing federal R&D contracts. ARPA-E has consistently impressed and surprised us with the speed of their evaluation and contracting process, and the high caliber of their staff. We had submitted several proposals well ahead of the ARPA-E solicitation from which we have yet to hear a response. And we have never seen a focus and dedication on getting under contract quickly and diligently. We wish all R&D programs could adopt this degree of efficiency and professionalism.



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